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DISEASES DUE TO PROTOZOAN PARASITES.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovines. La " fièvre de la côte orientale " et la theiléríose nord-africaine (étude expérimentale comparative). [**The Bovine Piroplasmoses. East Coast Fever and North African Theileriasis.**]—*Ann. Inst. Pasteur.* 1927. May. Vol. 41. No. 5. pp. 489–506. With 3 text figs.

This paper contains an account of the authors' comparative studies of the two conditions.

The East Coast Fever strain used was obtained from THEILER and DU TOIT in infected ticks (larvae and nymphs of *Rhipicephalus appendiculatus*).

They have been able to infect a total of 13 animals by means of ticks and in some cases have transmitted the infection direct by inoculation with blood or emulsions of organs containing the parasite.

Twelve of the 13 animals died, and one was killed on the 6th day. In two instances a single female tick sufficed to transmit the infection. The course of the disease was typical in every instance. The period of incubation averaged 12 days, and the rise of temperature was sudden. The fever lasted from 13 to 20 days, and in some instances the temperature fell prior to death.

Both kinds of blue bodies were found in the superficial lymphatic glands, or in the internal organs in 11 to 13 days after the application of the ticks.

Nine animals showed blue bodies in the peripheral blood. They were present for periods ranging from 2 to 10 days, and the number found was proportional to the stage of the disease.

The intracorpuscular parasites were seen from 12 to 21 days after tick infestation. In one case they appeared before the rise of temperature.

A blood count carried out the day before death in one animal showed only about $2\frac{1}{2}$ million red corpuscles per c.mm. Anisocytosis and polychromasia were seen in some cases.

Clinically the infection manifested itself by enlargement of the superficial glands, wasting, staring coat, diarrhoea, which was sometimes

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streaked with blood and petechiae were seen on the visible mucous membranes in the last stages.

The enlarged lymphatic glands were less haemorrhagic than is the case in North African theileriasis.

In four animals the spleen was of normal size. In three it was twice or thrice the normal size. There were sub-epicardial petechiae, and large ecchymoses under the endocardium. The liver was enlarged, numerous white infarcts were found in the kidneys, and there was ulceration of the abomasum, and sometimes of the intestine. There was no jaundice and no haemoglobinuria.

It is noted that in the North African disease the spleen is enlarged from the onset of fever.

The authors state that while in some of the carcases the findings were typically those of East Coast Fever, in others they were those of the North African disease, and that all intermediate forms were seen.

The authors have nothing to add to previous descriptions of the blue bodies. The intracorpuscular forms occurred in the following percentages:

Anaplasma-like	2·2 per cent.
Round forms	12·3 „ „
Elliptical forms	3·8 „ „
Rod forms	81·4 „ „
Cross forms	0·3 „ „

In experimental transmissions by inoculation with blood twelve animals were used, and in three cases the result was positive.

Eighteen animals were inoculated with emulsions of organs, and again with positive results in three cases.

The authors compare the two diseases as regards their evolution, the morphology of the parasites, cross-immunity tests, and xeno-diagnostic test.

In their evolution the diseases present practically no differences of importance; they cannot, in fact, be distinguished on clinical grounds, or by their pathological anatomy. Under natural conditions East Coast Fever is distinguished by the heavier mortality caused by it, and swelling of the spleen in less constant and less pronounced.

Blue bodies are found with greater frequency in the glands than in the liver in the case of East Coast Fever, while the reverse holds good in *T. dispar* infections.

In *T. dispar* the anaplasma, round, and elliptical forms account for more than 90 per cent. of the parasites. Rod forms number only some 7 per cent. and cross-forms only 0·2 per cent. This distinction is so marked that the blood smears can readily be recognized.

The intra-corpuscular forms in *T. parva* are richer in chromatin than in *T. dispar.*

In three experiments calves infected by inoculation with *T. parva* were subsequently infected by *T. dispar.* Similarly five animals which had passed through an attack due to *T. dispar* were infected by means of ticks with *T. parva.*

Two calves infected by inoculation with *T. parva* had infected ticks placed on them subsequently, but failed to react. It appears to be certain therefore that the two parasites should be considered distinct species.

Larvae of *R. appendiculatus* fed upon bovines infected with *T. dispar* did not transmit the infection as nymphs. Larvae of the same batch fed upon bovines infected with *T. parva* regularly transmitted the infection.

BRITISH MUSEUM

COOPER (H.). **Some Recent Advances in the Protection of Cattle and Other Animals against Disease. VI. The Piroplasmoses of Cattle in India.**—*Agric. Jl. India.* 1926. July. Vol. 21. No. 4. pp. 313–317. With 2 text figs.

Up to the present two types of piroplasm, using the word in a general sense, have been found in the blood of cattle in India. One of these belongs to the genus *Babesia* and the other to the genus *Theileria*. The former is *B. bigemina* and the latter *Theileria mutans*. In infections with the latter species lesions resembling those found in Egypt were found, and " blue bodies " were detected.

Brief reference is made to *Plasmodium bubalis*. This has been encountered twice only during the last three years, although it is said to have been seen not infrequently between its discovery and 1922.

In both the cases encountered recently, the parasite was found in smears which were subjected to scrutiny after the animals were dead and the carcases destroyed.

COOPER (H.). **Tick-borne Diseases, with Some Remarks on the Diseases of Cattle caused by Protozoa.**—*Agric. Jl. India.* 1926. Mar. Vol. 21. No. 2. pp. 95–100.

The author notes the occurrence of *B. bigemina* and *T. mutans* in Indian cattle.

In connexion with the latter it is said that in certain circumstances the virulence may be so exalted that it may produce a disease similar to East Coast Fever. " Microscopic examination of lesions found post-mortem in animals infected with *T. mutans* has revealed structures indistinguishable from those associated with the African disease." By this the author presumably means that " blue bodies " have been detected. The infection is transmitted by *Hyalomma aegyptium*.

Attention is drawn to the economic loss resulting from tick infestation alone, and a brief account of the process of dipping is given.

DONATIEN (A.) & LESTOQUARD (F.). Specificité du Trypanbleu dans le traitement des piroplasmoses vraies des ruminants. [**The Specific Action of Trypanblue on the True Piroplasms of Ruminants.**]—*Rev. Vét.* 1927. Mar. Vol. 79. pp. 133–139.

The authors suggest that the efficacy of trypanblue against the true piroplasms should be classed as a generic character. They strongly disagree with YAKIMOFF and others who found the drug effective against *B. bovis* and less effective than ichthargan and protargol against *B. bigemina*.

In bovines affected with true piroplasmosis the authors find that the injection of 1 per cent. trypanblue in the proportion of 1 g. of the drug per 100 kilos body weight produces the following effects.—

There is a progressive destruction of the parasites in the peripheral circulation which is practically complete within 24 hours. Within an hour or two of the injection the temperature rises 0·5 to 1·8 ° C., and then falls to normal within six hours. Clinical symptoms, which are sometimes severe, make their appearance. There may be muscular tremors, and acceleration of respiration which may lead on to marked dyspnoea, caused by oedema of the lungs. These symptoms are due to

the liberation of toxin from the destroyed parasites and not to the direct toxic action of the drug. Injection into healthy or chronically infected animals does not cause such symptoms.

In treating severe cases, where a large amount of toxin would be liberated, one should aim not at clearing the circulation but at killing off sufficient of the parasites to enable the animal to fight for itself, so to speak.

The dangers associated with the administration of large doses may be reduced by the use of 0·1 to 0·2 g. By this means the parasites are destroyed more slowly and the fall of temperature is less rapid, but alarming symptoms are avoided. Another advantage arising from the use of the smaller doses is that it leads to less discoloration of the tissues.

DE KOCK (G.) & QUINLAN (J.). **Splenectomy in Domesticated Animals and its Sequelae, with Special Reference to Anaplasmosis in Sheep.**— *Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 369–480. With illustrations, charts and tables.

Part I of this paper, covering some 5 pages, is devoted to an account of the operation of splenectomy.

Part II, covering some 25 pages, gives a general account of the experiments carried out.

The remainder of the paper gives the detailed protocols.

The authors conclude that a certain percentage of South African sheep become carriers of anaplasms, but the infestion has never been identified as a disease in them. The inoculation of sheep from some other centres in the Union with blood from such animals leads to the production of a mild form of anaplasmosis. This infection can be carried on in sheep by inoculation.

Splenectomy results, in such carriers, in the onset of severe symptoms of anaplasmosis. Some cases proved fatal.

Similar results followed splenectomy in equines infected with *Nuttallia equi*. The operation produced changes in the blood picture. There was marked oligocythaemia with the appearance of erythroblasts, normoblasts, and Jolly-bodies.

It would appear that the operation causes a condition of neutrophilia, and that a subsequent monocytosis is associated with the removal of damaged erythrocytes. The anaplasma of sheep was not transmissible to normal goats, but after splenectomy the goat could be infected. The period of incubation was prolonged.

No evidence could be found that anaplasmosis of sheep was associated with a filterable virus.

Anaplasma blood stored in citrate could retain its vitality for periods up to 5 weeks, and in one case for 9 weeks. No difficulty was experienced in differentiating between anaplasma and Jolly-bodies.

DE KOCK (G.) & QUINLAN (J. B.). **The Appearance of *Gonderia ovis* in the Blood of Splenectomized Sheep.**— *Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 255–256. With 1 plate.

Gonderia ovis has not been observed under ordinary circumstances in South Africa, but in the blood of splenectomized sheep that were carriers

of anaplasma typical Gonderia parasites were found. Cross-forms were rare, bacillary forms not common and ring-forms the most numerous. Transmission experiments to sheep and to a bovine failed.

KIKUTH (Walter). Piroplasmose bei Affen. [**Piroplasmosis in Monkeys.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Jan. Vol. 31. No. 1. pp. 37–41. With 1 coloured plate.

The only record of the occurrence of piroplasmosis in the monkey appears to be that by Ross in 1905 (Cercopithecus)

In the course of the examination of blood smears from a number of cercopithecus monkeys the author encountered parasites, apparently identical with that described by Ross, in one which, ten days before, had been subjected to extirpation of the spleen. Ring-forms and double pear forms were found. While in Ross's preparations parasites were scantily present, the author found, in the blood at the time of death approximately 30 per cent. of the corpuscles invaded. The infection was transmissible experimentally to *Macacus rhesus* and the period of incubation varied from a week to a month. In monkeys from which the spleen had been removed, there developed marked corpuscular evidence of anaemia. In a normal monkey the parasites rapidly disappeared from the peripheral blood. Five weeks later, during which time parasites were not discoverable in the blood, the spleen was removed and ten days later there was a relapse of piroplasmosis.

MARZINOWSKY (E.). Du développement de l' *Haemogregarina stepanovi.* [**The Development of** *Haemogregarina stepanovi.*]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. Vol. 5. No. 2. pp. 140–142. With 2 text figs.

Haemogregarina stepanovi is a parasite of the tortoise *Emys orbicularis*, and the intermediate host is *Hyalomma aegyptium.* No differentiation of sex can be seen in the parasites from the gut of the tick. Large vermicular forms can be found in the stomach of the ticks 24 hours after feeding.

ANDREWS (J. M.). **Coccidiosis in Mammals.**—*Amer. Jl. Hyg.* 1926. Nov. Vol. 6. No. 6. pp. 784–798.

The author finds that the incubative period is two to four days, and that symptoms are presented for periods not exceeding a week in cats infected with *I. felis* and *I. rivolta.* A primary infection is said to cause an immunity which persists for seven months and probably for life.

Andrews believes that human infections with Isospora are due to a parasite specific for man and that the disease is possibly more common than is generally believed.

YAKIMOFF (W. L.), GALOUZO (J. G.), RASTÉGAÏEFF (E. F.) & LOUKIANOFF (W. A.). A propos de la coccidiose des porcs en Russie. [**Coccidiosis of the Pig in Russia.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 215–218.

This paper contains tabular statements regarding the distribution of coccidiosis of pigs in different parts of Russia and comparative statements of the occurrence of the parasite in Germany, Holland and Russia. A third table shows the measurements of the parasites recorded by different authors.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Zur Kokzidiose der Hunde und Katzen in Russland. [**Coccidiosis of Dogs and Cats in Russia.**] —*Deut. Tierärzt. Wochenschr.* 1927. May. Vol. 35. No. 20. pp. 313–315.

The authors review the literature regarding these parasites, and tabulate the results.

No systematic examinations have been carried out, but two cases of infection in cats have been encountered. On account of the size of the parasites and their method of sporulation they are identified as *I. bigemina* and *I. rivolta*.

VAN HEELSBERGEN (T.). Coccidiosis. [**Coccidiosis.**]—*Tijdsch. v. Diergeneesk.* 1927. May 15. Vol. 54. No. 10. pp. 449–452.

This paper contains an account of the symptoms of coccidiosis in the fowl.

BEDFORD (G. A. H.). **Report on the Transmission of Nagana in the Ntabanana and Mhlatuze Settlements, Zululand.**—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 275–300.

The report is based upon a survey of blood-sucking insects found in the western section of the Lower Umfolosi Division of Zululand.

The paper contains an account of the area involved and of its opening up for settlement. It was thought that when the land was thrown open for settlement it had become fly and nagana free, but after opening it up in 1919, nagana made its appearance and from 1920 onwards most of the cattle succumbed. The survey showed that *Glossina pallidipes* was found at each point where systematic collecting was undertaken. It had previously been stated that glossina was not found South of the Mfolosi and Emseleni rivers.

Before settlement the disease was kept alive by game, but with settlement and the clearing off of the game, domesticated animals served to feed the flies and carry on the infection.

Although the distribution of the disease corresponds with the fly area there are reasons for thinking that glossina is not alone responsible. The cases of nagana are out of proportion to the number of tsetse. On the other hand cases of nagana and the number of flies increased as the game reserve was approached, and tabanidae and stomoxys are widespread but the distribution of nagana is limited and appears to coincide with that of glossina. The question of mechanical transmission is left more or less open.

The bulk of the paper is made up of a list of blood-sucking Diptera collected in the Ntabanana and Mhlatuze Settlements.

DI DOMIZIO (Giovanni). *Trypanosoma brucei* nella Somalia Italiana. [*T. brucei* **in Italian Somaliland.**]—*La Nuova Vet.* 1926. Oct. Vol. 4. No. 10. pp. 262–271; Nov. No. 11. pp. 290–297. With 4 plates and 11 text figs.

Dealing with the morphology of the trypanosome occurring in horses and cattle in Italian Somaliland, the author has used the graph form devised by BRUCE, and finds that the organism is polymorphic. He

distinguishes long, short, and intermediate forms. In the short stumpy type of parasite posterior-nuclear forms are encountered.

The smears used were fixed in methyl or ethyl alcohol and stained with giemsa. Four mules, two horses, a calf, and two dogs provided the blood for the smears, but approximately half of the 2,400 trypanosomes measured were in the blood of one of the horses. Only 100 trypanosomes from dogs were measured, and in none were posterior-nuclear forms found.

He concludes that the parasite belongs to the *brucei-rhodesiense-gambiense-nigeriense* group, and that it is actually *T. brucei*.

IWANOW (E.) & MESNIL (F.). Le trypanosome de la dourine traverse-t-il la peau ou les muqueuses saines ? [**Does the Trypanosome of Dourine pass through Sound Skin or Mucous Membranes ?**]—*Ann. Inst. Pasteur.* 1927. May. Vol. 41. No. 5. pp. 507–512.

The experiments recorded here were undertaken for the purpose of attempting to arrive at a definite conclusion as to whether *T. equiperdum* can penetrate sound skin and mucous membranes or not.

According to a number of authors, trypanosomes, and particularly *T. equiperdum*, can pass through sound mucous membranes, and NATTAN-LARRIER is of the opinion that they can penetrate sound skin.

Iwanow is of the contrary opinion. He holds that some lesion, however slight, is necessary for the penetration of *T. equiperdum*, even through mucous membranes. The positive results obtained by other investigators are, he believes, due to infection through minute injuries to the surfaces.

The experiments were carried out with rabbits, guineapigs and mice, and each animal was carefully examined with a lens for lesions of the skin or genital organs before it was used. No straw or hay, either of which, it is held, might occasion defects in exposed mucous membranes by pricking them, was used in the cages. Sawdust was used for bedding and the food was fresh lucerne. The mice were kept in glass jars covered with wire gauze. All animals were isolated for a fortnight before use, thus giving the opportunity to lesions which had escaped detection to cicatrize. Animals yielding negative results were used again.

Nine mice had citrated blood containing the trypanosome in large numbers placed on sound skin and none became infected.

Of 26 mice which had trypanosomes placed on the mucous membrane of the eye, one became infected. This infection is said to have resulted from an injury to the eyelid held by the forceps.

Four rabbits, two guineapigs, and nine mice had infective blood introduced into the vagina by sounds. None of the rabbits became infected. One guineapig contracted trypanosomiasis, but this was thought to be because the sound used was too large, and damage may have been done. Two of the mice became infected. In spite of the authors' statement that only animals with sound skins and mucous membranes were used in the experiments, it is recorded that one of these mice had eczema of the head and back, and that the skin was fissured. As the mice licked the blood exuding from the vagina it is suggested that the infection was carried to the diseased skin by the tongue in this instance. Seventeen mice had infective blood placed in the conjunctival sac. None became infected.

Seven mice had infective blood introduced into the vagina. One of these had the mucous membrane injured during the injection and this was used as a control. It was the only one to become infected.

Of eight guineapigs treated in the same way, two became infected. The vaginal mucous membrane was injured in both cases.

Four mice, two of which were suffering from eczema, had infective blood placed on the skin. The two with eczema became infected. The others remained healthy.

The authors suggest that the incidence of dourine in breeding establishments would be reduced by the introduction of artificial insemination.

KNOWLES (R. H.). **Trypanosomiasis of Camels in the Anglo-Egyptian Sudan: Diagnosis, Chemotherapy, Immunity.**— *Jl. Comp. Path. & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 59–71 (to be continued).

The native name for the disease is "gufar." It occurs in a number of provinces and its distribution follows fairly closely the distribution of the tabanidae. It is probable that the disease is closely allied to, if not identical with surra and it is certain that it is the same as El Debab and Mbori of Northern and North-west Africa.

The symptoms are those of surra, but in no case have cerebral symptoms been observed. In one instance there was partial paralysis.

It is thought that the percentage of recoveries is very small and it is not known whether in such cases there is a complete disappearance of trypanosomes. It is probable that reputed recoveries are really cases in the chronic stage.

The sub-acute stage is most commonly encountered in animals that are well fed and are not worked hard. Such animals may remain in good condition. A large proportion of acute cases, however, occur under the same conditions.

Tabanus taeniola and *T. sufis* are thought to be the chief transmitters, but *Pangonia rupelli* and stomoxys are also possible agents. *Diagnosis.*—Microscopic examination of fresh blood is most useful in acute cases in which trypanosomes are seldom absent from the blood for more than a few days. It is practically useless in chronic cases in which the intervals may be very long.

Animal inoculation is the most reliable method, but it is not applicable to large numbers of animals under field conditions. In gerbils inoculated experimentally parasites generally appear in the blood within ten days, and the course is fairly acute or sub-acute. The formol-gel test has been investigated. The author's technique is to add two drops of formalin to 1 cc. of serum, and leave the tubes at room temperature (75–100° F.) for 24 hours. Diagnosis is based upon the presence or absence of gelation. Opalescence is not recorded. The author notes the necessity of sterilizing the needles used for bleeding to avoid transmission of the disease by inoculation.

In describing his observations in connexion with the test the following factors are taken into consideration by the author :—

(1) Do all infected camels react?
(2) The time required for the development of the power to react after infection.
(3) Do healthy camels fail to react?
(4) Do camels suffering from other diseases give the reaction?
(5) Do animals that have been treated successfully react?

Of 125 camels diagnosed by microscopic examination, 123 were positive to the formol-gel test.

In three control camels inoculated experimentally the periods elapsing between inoculation and the development of power to react ranged from 37 to 50 days. This, however, does not affect the reliability of the test, because work of this kind is not done before November (and should not be done before that month) because infection takes place during or after the rainy season.

Tests with healthy camels showed that the percentage error in the direction of incriminating healthy animals may be from 5 to 7 per cent., but as treatment is harmless the only drawback is the cost of treating such animals. Reactions in healthy animals are sometimes temporary.

The figures given by the author show that recovery following treatment is associated with the loss of power to give the formol-gel reaction, and the period required for the disappearance of the power is about the same as that required for its development.

There is little evidence to show that diseases other than trypanosomiasis may cause serum to give a positive reaction.

YAKIMOV (W. L.), AMANJOULOV (C. A.), ARBUSOV, JURAVLEV & CHERNOMORSKOV. [**An Experiment on the Prophylactic Use of Naganol (Bayer 205) in Camel Trypanosomiasis.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 1. pp. 43–46. [In Russian.]

The authors have been engaged in a campaign against camel trypanosomiasis in the Ural region since 1923. The number of camels examined was 11,052, trypanosomes having been found in from 25 to 40 per cent., according to locality. The trypanosome referred to as "*T. ninae kohl-iakimoff*" [sic] probably represents a race of *T. evansi*. All attempts to check the frequent epizootics of trypanosomiasis by therapeutic means having failed, a commission was sent to the province with the view of testing the practicability of prophylactic treatment with "Bayer 205" ("Naganol"). For the experiment, 91 healthy camels were selected and divided into two batches, those in the first (53) receiving from 5 to 10 gms. of the drug subcutaneously, those of the second (38) serving as controls. The camels were then divided into four groups and placed on pasture in different localities. Three months later they were examined and their blood was inoculated into guineapigs. Trypanosomes were found only in a group of 7 control camels, whilst 14 of the same group treated prophylactically remained uninfected. No infection occurred in the remaining three groups.*

KASAI (K.) & AKAZAWA (S.). **The Prophylactic Action of "Bayer 205" against Experimental Infection with a Trypanosome of the Formosan Water Buffalo.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 97–100. Authors' English abstract.

Water-buffaloes, zebras, and dogs in Formosa suffer from a trypanosomiasis which is closely related to surra. This paper contains an account of experiments connected with the prophylactic action of "Bayer 205" in experimental animals. Mice, cattle, and horses have been used.

The subcutaneous injection of mice with ·005 g. conferred protection against inoculation for five months, after which the resistance declines and finally disappears. Trypaflavin, trypanblue, tartar emetic,

* Summarized by Mr. C. A. HOARE.

neotrepol, atoxyl, neosalvarsan, and silver salvarsan were without effect in corresponding doses, save that the last two protected for 3 days and one week respectively.

Doses of ·0001 g. of " 205 " protected for a week, and for some weeks after this the period elapsing between inoculation and death was prolonged. In some instances recovery took place. ·00003 g. proved to be about the minimum dose exercising any protective power.

In calves the subcutaneous injection of 1 g. per 100 kilos protected for 4 months. In horses 1 g. per 100 kilos. was not protective, but the duration of the disease was prolonged. Doses of 2 g. per 100 kilos. protected for 3½ months.

In a supplementary experiment it was found that doses of 4 g. did not exercise any inhibitory action in rinderpest.

BLANCHARD (M.), BROUDIN (L.) & BOREL (E.). Surra du chien. Traitement par " Bayer 205." Guérison (?). Expériences négatives de transmission de l'affection par *Rhipicephalus sanguineus* Latr. [**Canine Surra. Treatment with " Bayer 205." Recovery (?). Negative Experiments in Transmission with** *R. sanguineus* **Latr.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 222–225.

These workers in Saigon describe a case of trypanosomiasis in a dog caused by a trypanosome with the morphology of *T. annamense* Laveran 1911. The animal had been ill for some time and showed dullness, difficulty of movement, oedema of the legs, etc. The blood contained large numbers of trypanosomes. *Rhipicephalus sanguineus* in various stages of development was present on the skin in large numbers. Treatment was begun with 0·5 cg. of " Bayer 205 " dissolved in 5 cc. of distilled water and injected subcutaneously. During the next few days there was a remarkable improvement in the dog's condition.

Paretic symptoms again appeared, but at what interval cannot be stated as the original paper appears to contain an error in a date. According to the dates given, the interval was about 5 weeks, but the authors state that it was on the 5th day. These rapidly disappeared and the dog a month later appeared to be in perfect health.

The authors took the opportunity of testing the possibility of the transmission of surra by the ticks. In the first place they examined the intestinal contents of nymphs and adults, and though they could readily detect red and white corpuscles they could find no trace of flagellates.

Ticks from the dog were placed upon rabbits and a puppy but no infection took place.

Finally, larvae hatched out from eggs laid by females obtained from the dog were placed upon white rats. No infection took place.

VINZENT (R.). Spirochétose de la souris blanche et infection mixte trypano-spirochétique. [**Spirochaetosis of the White Mouse and Mixed Trypanosome and Spirochaete Infection.**]—*Ann. Inst. Pasteur* 1927. Feb. Vol. 41. No. 2. pp. 131–147. With 8 graphs.

In a mouse inoculated with blood containing *T. somaliense* there was found a spirochaete. In sub-inoculations the spirochaete was separated from the trypanosome by keeping the blood used for inoculation for three days before use. In this period the trypanosome died only and the spirochaete survived.

Subsequently it was found by inoculation experiments that *T. somaliense* failed to develop in mice previously inoculated with the spirochaete while the spirochaete persisted, but the protection ceased with the termination of the spirochaete infection.

The author does not think that the action was a directly antagonistic one between the organisms.

CHANNON (Hilda A.) & WRIGHT (Hedley D.). **Observations on Trypanosomiasis of Rabbits, and its Natural Mode of Transmission.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 253–260. With 1 fig.

The observations recorded in this paper were made to determine the mode of transmission of a strain of trypanosomes accidentally found in the blood of a hutch rabbit in the course of an examination for other purposes.

Measurements of 300 parasites in blood smears from an experimentally infected rabbit showed that it averaged 24·17 μ in length by 1·35 μ in breadth, the latter excluding the undulating membrane. There was a free flagellum, which is included in the above measurement of length, about 9 μ long. These measurements are less than those given by JOLYET and DE NABIAS (30–36 μ) and ASHWORTH and others (28·4 μ).

The parasite appeared to be consistently monomorphic.

By intravenous injections it was found possible to carry the strain through 12 generations using 75 rabbits. Thirty-four became heavily infected, 21 showed a slight infection and in the remainder examination of moist blood from the ear failed to reveal infection.

Subcutaneous and intraperitoneal inoculations failed in the few cases in which they were tried. The results obtained with different infective doses were variable, and suggested that individual susceptibility rather than dose was the factor determining infection.

The period of incubation was 7 days, and parasites rapidly increased in numbers. A steady infection was maintained for an average of one month, but the upper and lower limits of this period were very wide apart. Complete recovery occurred.

Mice, rats and guineapigs appeared to be insusceptible.

An experiment showed that the parasite could be conveyed by the rabbit flea *Spilospsyllus leporis*.

Detailed examination of fleas indicated that the development of the parasite ran parallel with that of *T. lewisi* in the rat flea.

Experimental evidence was obtained that the injection of infected fleas causes infection. Injection of blood containing trypanosomes, on the other hand, does not.

Recovery leaves immunity, but the blood of recovered animals cannot be shown to contain any immune bodies.

Attempts to cultivate the parasite failed.

MAZZA (S.). Observación de infección espontánea del perro por el *Schyzotrypanum cruzi*. [**Spontaneous Infection in the Dog with *Schizotrypanum cruzi***.]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 82–86. With 4 figs.

A very limited invasion of the blood by the parasite was found in a puppy ten months old. There was marked evidence of anaemia. The

blood count showed a little over two million red corpuscles and seventeen thousand white corpuscles. The usual corpuscular abnormalities were found.

BREINDL (V.) & JIROVEC (O.). Ueber einige Abnormitäten bei *Trypanosoma lewisi.* [**Abnormalities in** *T. lewisi.*]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Feb. 5. Vol. 101. No. 6–7. pp. 417–418. With 2 text figs.

The authors figure and describe two abnormal trypanosomes found in the blood of a heavily infected rat. In one, a dividing parasite appeared to have no macronucleus and in the other, a particularly large parasite, there appeared to be a very large granular kinetonucleus near the macronucleus, the flagellum arising from a single small basal granule.

CHATTERJEE (G. C.), ROY (H.) & MITRA (A. N.). **Notes on** *Pentatrichomonas canis auri* **n. sp.**—Reprint from the *Jl. of the Depart. of Science.* 1926. Vol. 8. pp. 11–14. With 1 plate.

The authors figure and describe a Pentatrichomonas obtained from the caecal contents of an Indian jackal.

Cultures were obtained in saline containing peptone.

ARTAMONOFF (A. S.). Zur Frage der Verbreitung der innerlichen Leishmaniasis in Samarkand und die Heilung der Krankheit durch die Präparate des Stibiums. [**The Spread of Internal Leishmaniasis in Samarkand and its Treatment by means of Preparations of Antimony.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Jan. Vol. 31. No. 1. pp. 32–37.

After giving tabular statements regarding the incidence, duration, etc. of the disease, the authors state that in the treatment of the disease, they used 2 per cent. solutions of antimony potassium tartrate, neosalvarsan, stibosan and antimosan. The age of the patient does not appear to be a factor in calculating the doses required. Constitution and the severity of the disease are the important factors.

CURSON (H. H.). **Does a Species of Leishmania occur in the Goat ?**—*Union of S. Africa, Dept. of Agric. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 29–30. With 1 coloured plate.

Reference has already been made to the parasite detected in the blood of the goat by the author. The author discovered in a blood smear from a goat which had been used for the feeding of flies in some trypanosome investigations a group of parasites and a few isolated individuals having a morphology closely resembling that of Leishmania. They measured 2 μ to 5 μ in length by 1 μ to 3 μ in breadth.

The circumstances prevented any further investigation. The author suggests that provisionally the organism may be considered as a species of Leishmania and proposes the name *Leishmania caprae,* n. sp.

BENNETT (S. C. J.). **A Peculiar Equine Sarcosporidium in the Anglo-Egyptian Sudan.**—*Vet. Jl.* 1927. June. Vol. 83. No. 6. pp. 297–304. With 6 text figs.

The author describes a parasite which he believes to be a new species, and which, there is little doubt, was pathogenic.

The infection was detected in a nine-year-old country-bred pony.

The first symptoms observed were weakness, swelling of the legs, and eruptions on the skin followed by loss of hair in patches. The animal was rested and well fed and in three months was able to work again, but symptoms reappeared within a short time.

Blood examination for trypanosomes was negative, but sarcospores were found, and arrangements were made to send the animal to Khartoum for observation.

Throughout a month's observation the condition of the animal remained practically constant. It was a picture of extreme dejection, the coat was harsh, and the legs swollen and scurfy. The pulse and respiration were normal, there was no evidence of pain, and none of the superficial glands were enlarged. The appetite was good, but there was excessive thirst.

The temperature chart was that of a persistent irregular low fever. The blood picture was normal, save for the presence of the sarcospores. These were found daily in the smears.

At the post-mortem examination all organs and tissues appeared to be normal save the muscles and the mucous membrane of the laryngeal region.

The whole of the muscles were pale brown in colour, and so friable that even with a sharp knife it was almost impossible to excise a block of firm tissue for histological examination. No sarcocysts were recognisable with a hand lens.

The mucous membrane covering the whole of the larynx anterior to the glottis, the oval surface of the tip of the soft palate, and the glosso-epiglottic folds were studded with small whitish nodules rather less than a millimetre in diameter. No nodules were found in the pharynx, trachea, or oesophagus.

The sarcospores found in the blood were about 10 μ in length, by 4μ in width, but in the thicker parts of the smears, where they were always more numerous, they were rather more slender, and showed a greater tendency to be curved. In well-stained specimens a collection of rather purplish granules could be found near the centre of the body, the general cytoplasm staining pale blue.

Examination of sections from pieces taken from the neighbourhood of the larynx showed that the nodules were in reality sarcocysts. The following points are noteworthy. The sarcocysts were found almost entirely in the submucous connective tissue, and not in the muscular tissue. The cysts appeared to be spherical, and even the few found in the muscular tissue were of the same shape. There was no evidence of tissue reaction. The distribution of the cysts and the appearance of scars and degenerated epithelium at the surface suggested that there was a progressive movement of the cysts from within towards the surface as they increased in size. Microscopic examination of sections of skin revealed a picture practically parallel with that presented by the laryngeal mucous membranes. Signs of migration of the parasites outwards were found, and it would appear that the passage of the parasite through the epithelium was rapid when once the rete mucosum

had been reached. Healing wounds were frequently found in sections, but in a single instance only was a fresh rupture found.

Very large numbers of sections from various muscles were examined, but not a single sarcocyst was found. The muscular tissue was extensively affected with Zenker's degeneration.

LEVADITI (C.), with NICOLAU (M. & Mme.) & MANIN (Y.). Le tellure, nouvel élément agissant curativement dans la syphilis. [**Tellurium, a New Drug for the Cure of Syphilis.**]—*Ann. Inst. Pasteur.* 1927. Apr. Vol. 41. No. 4. pp. 369–442. With 1 plate in colour and 19 text figs.

The drugs tested by the authors were the following: Tellurite of sodium, tellurite of potassium, tellurium trioxide, biniodide of tellurium, iodo-tellurate of quinine, methyl-tellurid, diphenyl of tellurium, and 4- ethylcyclotelluropentanedione, tellurium in fine suspension, colloidal tellurium, and tellurate of bismuth. The organisms used in the experiments were *Treponema pallidum, Spirochaeta cuniculi, Spirochaeta gallinarum, Spirillum duttoni,* and the trypanosome of nagana. Experiments carried out with rabbits, fowls, and mice showed that the potassium and sodium salts were the most toxic. By the intramuscular path the methyl and diphenyl compounds were the least toxic. In fine suspension by intramuscular injection the element is ten times less toxic than the sodium salt, taking into consideration the amount of tellurium in the latter.

The toxity is not only a function of the amount of tellurium contained in the compounds, but also of the chemical composition. The iodo-tellurate of quinine is about ten times as toxic as the oxide or the iodide.

Soluble compounds are absorbed rapidly and completely, and are more toxic than the insoluble compounds.

The symptoms of intoxication are convulsions, generalized paralysis, salivation and haematuria.

Later it is stated that tellurium possesses haemolytic properties and that haemoglobin appears in the urine. *In vitro* experiments show that the presence of serum favours haemolysis. Administered in sufficiently small doses it produces no serious toxic effects, and does not disturb nutrition or the secretion of urine.

The drug is eliminated by respiration, sweat, bile, urine and in the faeces.

When a tellurium compound is injected intra-muscularly it undergoes a process of progressive dissolution. It is absorbed in the form of proteo-metallic derivatives. In the cells of the reticulo-endothelial system the cytoplasm and mitochondria cause it to undergo reduction. Other cells ingest the tellurium injected directly and transform it. In this form the drug circulates in the body and reaches the lymphoid tissues, which fix it while reducing it. The drug is secreted by the epithelium of the convoluted tubes and of the ascending loop of Henle.

Tellurite of sodium injected intra-muscularly at the same time as *S. gallinarum* exercises only a feeble protective action. The tolerated dose, which ranges from ·0015 to ·002 g. per kilo, causes the infection to be slight and of brief duration, but it does not prevent infection. *In vitro* tellurite of sodium in a 1 in 200 concentration immobilizes *S. gallinarum* in 2 hours at 37° C.

Spirillum duttoni infections in the mouse are not affected at all by intramuscular injections of iodo-tellurate of quinine. Tellurite of sodium in 1 in 10,000 solution immobilizes the trypanosome of nagana in three hours at 37° C. in the presence of rabbit serum, but neither tellurite of sodium nor iodo-tellurate of quinine prevent infection of mice with the parasite.

Niño (F. L.). A propósito de las formas endoglobulares del *Schizotrypanum cruzi* en la sangre periférica de la lauchita blanca. [**The Endoglobular Forms of** *Schizotrypanum cruzi* **in the Peripheral Blood of the White Lauchita (? Mouse).**]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 120–122. With 1 coloured plate.

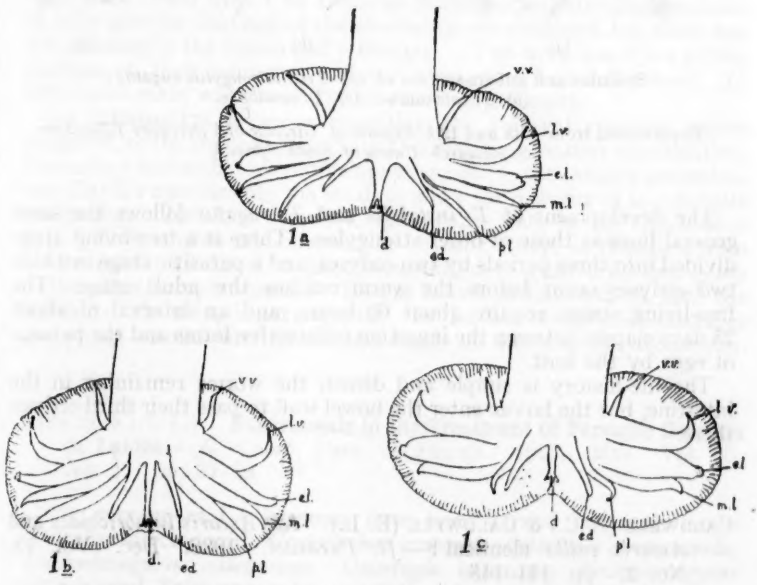
Quiroga (S. S.) & Scasso (R.). Epidemia de Enteritis coccidiana en los pollitos. [**Epidemic of Enteritis due to Coccidia in Fowls.**]—*Revist. Zootech.* 1927. Feb. 15. Vol. 14. No. 161. pp. 35–40.

DISEASES DUE TO METAZOAN PARASITES.

Monnig (H. O.). **The Life-Histories of** *Trichostrongylus instabilis* **and** *T. rugatus* **of Sheep in South Africa.**—*Union of S. Africa Dept. Agric. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 231–251. With 11 figs.

Nematodes of the genus Trichostrongylus are said to have become a serious menace in South Africa during recent years only.

T. extenuatus, which occurs in the abomasum, has been encountered by the author in his investigations but only occasionally.



Male Bursa of (*a*) *Trichostrongylus rugatus*; (*b*) *T. extenuatus*; (*c*) *T. instabilis*.

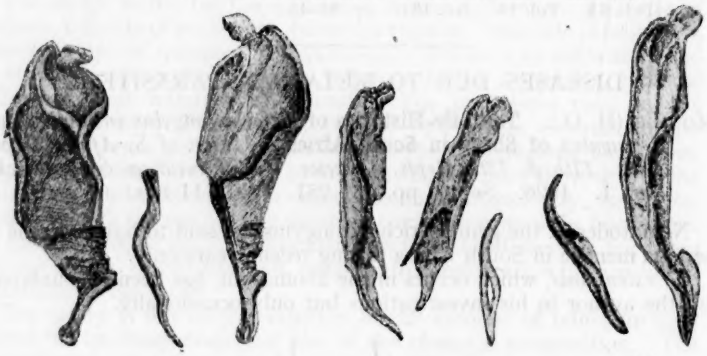
[Reproduced from *11th and 12th Reports of Director of Veterinary Education & Research, Union of South Africa.*]

T. instabilis and *T. rugatus*, which are found in the anterior 8 to 12 feet of the small intestine, are responsible for serious losses.

T. rugatus Monnig 1924 is figured and described, and an account of the life history is given.

It is practically impossible to distinguish the females of the species from those of *T. instabilis* as they differ only in their average size, *T. rugatus* being slightly larger.

The males are more easily distinguished. The spicules of *T. rugatus* are dissimilar, relatively broad at the anterior part and show ridges on their ventral surfaces. It differs from *T. instabilis* in that the postero-lateral ray of the bursa is longer. *T. rugatus* appears to differ from *T. falculatus* Ransom 1911 mainly in the details of shape of the spicules.



(*a*) (*b*) (*c*)

Spicules and gubernaculum of (*a*) *Trichostrongylus rugatus*; (*b*) *T. extenuatus*; (*c*) *T. instabilis*.

[Reproduced from *11th and 12th Reports of Director of Veterinary Education & Research, Union of South Africa.*]

The development of *T. instabilis* and *T. rugatus* follows the same general lines as those of other strongyles. There is a free-living stage divided into three periods by two ecdyses, and a parasitic stage in which two ecdyses occur before the worm reaches the adult stage. The free-living stages require about 60 hours, and an interval of about 25 days elapses between the ingestion of infective forms and the passage of eggs by the host.

The life-history is simple and direct, the worms remaining in the intestine, but the larvae enter the bowel wall to pass their third ecdysis there.

CALDWELL (F. C.) & CALDWELL (E. L.). **Are *Ascaris lumbricoides* and *Ascaris suilla* identical ?**—*Jl. Parasitol.* 1926. Dec. Vol. 13. No. 2. pp. 141–145.

The authors discuss the evidence regarding the identity or otherwise of the worms and from their own investigations conclude that their evidence supports the view that the two are not identical.

TAYLOR (E. L.). **The Administration of Draughts to Sheep and Cattle, with Special Reference to Treatment for Verminous Gastro-enteritis.** —*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 27–34.

The author points out that little work has been done regarding the paths taken by drugs administered to cattle and sheep. He states that the value of sulphate of copper in the treatment of parasitic gastritis in sheep is well known, but that with cattle failures have been reported. Three possible explanations for this are offered: (1) That in cases where treatment fails the causal worm is not *Haemonchus contortus*, but probably *Ostertagia ostertagi* or some other small trichostrongyle; (2) that there is some difference in the swallowing process of the two genera; (3) that inadequate doses have been given.

A brief review is given of the work done in connexion with attempts to control the path by placing animals in different positions, and the conclusion is drawn that the results are very discordant.

The author's own experiments have been carried out with fourteen cattle from 1 to 2 years of age, and seven sheep of the same age.

A 1 per cent. solution of methylene blue was given in amounts ranging from 10 to 30 ounces to the cattle. In 11 instances the dose was 10 ounces. It is not stated what interval elapsed between dosing and slaughter, and the method of killing is not specified. In two cases only was any blue colour found in the abomasum, and in these the colour was deep. The rumen and reticulum received the bulk of the fluid.

Of the sheep used, one was dosed with 4 ounces through a stomach tube. There was stain in the rumen and a trace in the reticulum only. Four were dosed with 1 to 4 ounces in the normal standing position. In each case the contents of the abomasum were stained, but there was also staining in the rumen and reticulum. Two were dosed in a sitting position on their haunches and the doses were 4 and 8 ounces. In both cases stain was present in all four compartments.

No information is given regarding the interval elapsing before slaughter, or the position of the animal during post-mortem examination. The author states that his results appear to add to the existing confusion, and that his numbers are too small to allow the drawing of any definite conclusions. He does, however, specifically state in his conclusions that " Medicaments administered to yearling sheep, as draughts from a wine bottle, go direct to the abomasum, only a small portion going to the other compartments." He has found, as have others, that the position of the sheep is not material. In the case of cattle he concludes that drugs administered in solution rarely go direct to the abomasum.

SHEATHER (A. L.). **Experiments in the Treatment of Parasitic Gastritis in Lambs.**—*Jl. Comp. Path. & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 37–59.

The experimental treatments have been carried out with lambs naturally infected with *Haemonchus contortus, Ostertagia circumcincta, Trichostrongylus extenuatus, Ostertagia trifurcata, Trichostrongylus vitrinus*, and *Trichostrongylus instabilis*. Some indirect evidence was obtained that the first of these was killed by VEGLIA'S mixture of sodium arsenite and sulphate of copper, but this was quite without effect upon the other species. The following substances were tested

against these without effect in any instance :—Bleaching powder, sodium bisulphite, carbon tetrachloride, iodine, Derris root powder, copper oleate, oil of chenopodium, thymol and lime and sulphur wash.

BLANCK (E.). Beitrag zur Kenntnis der Mikrofilariose im Blute beim Pferde. [**Microfilaria in the Blood of the Horse.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Apr. Vol. 55. No. 6. pp. 557–579. With 4 text-figs.

The author records the occurrence of microfilarial infection in a horse in Sweden. The animal was brought to the clinique of the Veterinary School at Stockholm because it was showing marked evidence of wasting. The horse was a recent purchase and unfortunately no very full particulars of its previous history were obtainable. During a period of one and a half months the animal was kept under observation, and although there was no improvement in condition the appetite was maintained. There were general signs of anaemia.

The pulse was weak but regular when the animal was at rest, but a brief period of exercise caused the drop of a beat about every fifth beat and sweating, and the animal was in danger of falling.

Rectal examination revealed slight enlargement of the spleen. Although the visible mucous membranes suggested anaemia, blood counts indicated that the corpuscular contents of the blood were practically normal. The condition really appeared to be one of oligaemia. While it was under observation the horse developed a nodular condition of the mucous membrane of the mouth. The small nodules subsequently became converted into erosions. Microscopic examination of a nodule removed surgically showed that small necrotic centres were present in the epithelium and that in many of these microfilariae could be found. Spontaneous recovery from the stomatitis occurred in 12 days.

While the animal was under observation the number of parasites discoverable in the blood increased from 1 to 3 per drop to 25–30. In the blood the parasites measured 250–300μ in length. Attempts to transmit the parasite by inoculation to rabbits and guinea-pigs failed.

At the post-mortem 52 specimens of *Filaria papillosa* were found in the peritoneal cavity.

No structural disease of the heart was discovered.

ITAGAKI (Shiro) & MAKINO (Rokuro). **Studies on the Treatment of Microfilaria immitis Infection by Intravenous Injection of Natrium Antimonyl Tartrate.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 15–23.

Preliminary experiments regarding the toxicity of the drug appeared to indicate that the susceptibility of dogs to the drug varied. In some cases ·01 g. per kilo. proved fatal, and doses of ·005 g. per kilo on 7 successive days in some cases proved toxic for healthy dogs. Two dogs tolerated ·004 g. per kilo. on 7 successive days, while in some instances ·004 g. per kilo. repeated on four days caused death.

It was found that the administration of 3 doses at the rate of ·003 g. per kilo. at intervals ranging from 1 to 5 days was sufficient to kill M. immitis in the circulation in one instance, but not in all. In most cases

symptoms of poisoning made their appearance. Seventeen dogs put under treatment were given doses ranging from ·003 to ·004 g. per kilo. at intervals of 1 or more days. The microfilariae disappeared from the circulation. Dogs kept under observation for several months failed to show any return of the parasites to the circulation although living worms were found in the heart on post-mortem. In one dog killed 8½ months after treatment no embryos could be found in the uterus of a female worm in the heart.

MARZINOWSKY (E.). Du développement de la Microfilaire du *Gymnodactylus fedschenki*. [**The Development of the Microfilaria of** *Gymnodactylus fedschenki*.]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 114-116. With 2 text figs.

The author describes the microfilaria and concludes that it is different from that described by DELANOË as occurring in *Agama colonorum*. Although eggs could be found in smears from the liver, the adult worm was not found.

FAUST (Ernest Carroll). *Thelazia* **Infection of Man and Mammals in China.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. 31. Vol. 20. Nos. 5 & 6. pp. 365–369. With 2 plates.

Study of the original material of ocular nematodes from man and the dog in China, as well as material recently secured from a dog and rabbit in Peking leads the author to concur with LEIPER's view that the worms from man, the dog and the rabbit are all *Thelazia callipaeda*. *T. callipaeda* males are described for the first time.

The occurrence of *T. rhodesii* in cattle in China is recorded.

NEVEU-LEMAIRE (M.). *Protospirura hamospiculata* n. sp. nématode parasite d'un Pangolin africain *Manis* (*Pholidotus*) *temmincki*.—[*Protospirura hamospiculata* **n. sp. Parasite of** *Manis* (*Pholidotus*) *temmincki*.]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 107–113. With 1 text fig.

Examination of 116 nematodes contained in a bottle in the Parasitological Laboratory of the Faculty of Medicine, Paris, has enabled the author to give a detailed description of the worm and he finds that it is a new species. In the paper under review the worm is figured and described, and the distinguishing characters of the nine known species are given. The right spicule of the male terminates with a barb.

HENRY (A.). Distomatose pulmonaire chez le Vison. [**Pulmonary Distomatosis in the Mink.**]—*Rec. Méd. Vét.* 1927. Mar. 30. Vol. 103. No. 6. pp. 84–88. With 2 text figs.

Two cases have been encountered and in each the presence of the parasites in the lungs was the only assignable cause of death. It was remarkable that both animals died more or less suddenly. The parasite has been identified as *Paragonimus kellicotti* Ward, 1908. The minks in which the parasites were found were imported from the United States (Minnesota) and the author suggests that careful examinations of the faeces of imported animals should be carried out in order that infection may be detected. The life cycle of the parasite is not fully known, but

it must be borne in mind that the conditions necessary for its development may be available in France and there is a possibility that the parasite may establish itself there.

VAN HEELSBERGEN (T.). Echinostomiasis bij de duif door Echinostoma. [**Echinostomiasis in the Pigeon caused by Echinostoma.**]—*Tijdschr. v. Diergeneesk.* 1927. May. Vol. 54. No. 9. pp. 414–416. With 1 text fig.

The author figures and describes an Echinostoma causing serious disease in pigeons.

VAN HEELSBERGEN (T.). Echinostomiasis bij kippen door Echinoparyphium. [**Echinostomiasis in Fowls caused by Echinoparyphium.**]—*Tijdschr. v. Diergeneesk.* 1927. May. Vol. 54. No. 9. pp. 413–414. With 1 text fig.

The author figures and describes an Echinoparyphium which was responsible for serious enteritis in fowls in Holland.

FAUST (E. C.) & NISHIGORI (M.). **The Life Cycles of Two New Species of Heterophyidae, Parasitic in Mammals and Birds.**—*Jl. Parasitol.* 1926. Dec. Vol. 13. No. 2. pp. 91–128. With 4 plates & 4 text figs.

In this paper the authors describe the morphology and life history of *Monorchotrema taihokui* and *Monorchotrema taichui.*

The former has as hosts :—

1. Mollusc. *Melania reiniana* var. *hidachiens.*
2. Fresh water fish of various families.
3. Birds, dog, cat, rabbit, mouse, guineapig and man.

The latter has as hosts :—

1. Mollusc. *Melania obliquegranosa.*
2. Fish.
3. Birds (?), mammals, including man (experimental infection).

KIESSIG (W.). Uber die Behandlung der Leberegelkrankheit der Schafe. [**The Treatment of Fluke Disease in Sheep.**]—*Deut. Tierärzt. Wochensch.* 1927. Mar. 26. Vol. 35. No. 13. pp. 203–206.

The author finds that a remedy known as Serapis SB.444 is valuable.

JOYEUX (Ch.) & BAER (J. G.). Recherches sur quelques espèces du genre *Bothridium* de Blainville, 1824 (*Diphyllobothriidae*). [**Some Species of the Genus** *Bothridium* **Blainville, 1824.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. Vol. 5. No. 2. pp. 127–139. With 5 text figs.

The authors give descriptions of Bothridium found in pythons in Africa and Asia. They conclude that there are two species, *Bothridium ovatum* and *Bothridium pythonis,* but the specimen they describe differs from the latter in being smaller. They are not in a position to say whether the two are really distinct on this account and suggest the name *B. pithonis* Bl., 1824, var. *parvum.* nov. var.

BUGGE (G.). Uebertragung von *Linguatula denticulata* auf einen Hund. [**The Transmission of *Linguatula denticulata* to a Dog.**]—*Deut. Tierärzt. Wochensch.* 1927. May 28. Vol. 35. No. 22. pp. 345–349.

In five instances the author has detected larvae in the mesenteric glands of cattle. The parasites measured 5–6 mm. in length, and the number found varied from 10 to 44.

Sixteen larvae were given to a young sheep dog and 41 days later nine immature Linguatula were found in the nasal cavity.

BEDFORD (G. A. H.). **Check-List of Muscidae and Oestridae which cause Myiasis in Man and Animals in South Africa.**—*Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 483–491.

BEDFORD (G. A. H.). **A Check-List and Host-List of the External Parasites found on South African Mammalia, Aves, and Reptilia.**—*Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 705–817.

JOYEUX (Ch.). *Diphyllobothrium mansoni* (**Cobbold, 1883**).—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 226–228.

MAZZA (S.), ROSENBUSCH (F.) & ANTEQUEDA (E.). "Microfilaria" sp.? de los perros del Norte. [**Microfilaria sp.? of the Dog.**]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Nos. 14, 15, 16. 8 pp. With 6 text figs.

ROBERTS (J. I.). **The Anatomy and Morphology of** *Hippobosca equina*.—*Ann. Trop. Med. & Parasit.* 1927. Mar. Vol. 21. No. 1. pp. 11–22. With 2 plates.

STUNKARD (H. W.). Sur l'*Unicaecum ruszkowskii*, trématode sanguicole des tortues d'eau douce de l'Amérique du Nord. [*Unicaecum ruszkowskii*. **A Blood-Sucking Trematode of Fresh Water Turtles of North America.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 117–126. With 3 text figs.

BACTERIAL DISEASES.

HARNACH (R.). Recherches sur le moment auquel apparait la bactériémie charbonneuse chez le boeuf. [**The Time at which Anthrax becomes Septicaemic.**]—*Rec. Méd. Vét.* 1927. Feb. 28. Vol. 103. No. 4. pp. 68–73.

It is generally agreed that anthrax bacilli are not present in the blood in large numbers until shortly before death. The older authors fixed the period at which the disease became septicaemic at a quarter of an hour to four hours before death. HUTYRA and MAREK state that the period may be as long as eighteen hours.

Similar differences of opinion have been expressed in connexion with small animals infected with anthrax.

The author has had the opportunity of making systematic examinations of the blood of animals grazing on land where cases of anthrax were frequent. He has examined 17 cattle and eight pigs. He finds that the onset of clinical symptoms does not synchronize with the appearance of the bacilli in the blood in large numbers. The duration of the septicaemia may vary within wide limits. In five cases of anthrax which he describes as subacute, it varied from 2 to 187 hours. But since all the animals either recovered without treatment or were successfully treated with anti-serum, it cannot be said that in all the cases this interval could be described as normal.

Further, the author states that serum therapy has proved useless when once septicaemia is established. It appears therefore to be doubtful whether septicaemia could have been fully established in the cases recorded.

NIEBERLE (K.) & STOLPE (B.). Zur Kenntniss des metastatischen Hautmilzbrandes beim Schwein. [**Metastatic Anthrax of the Skin in Pigs.**]—*Deut. Tierärzt. Wochensch.* 1927. Apr. 30. Vol. 35. No. 18. pp. 281–283.

The authors describe two cases of anthrax of the skin in pigs. The lesions appeared as areas of reddening or haemorrhage scattered over various parts of the body. They were irregularly rounded and about 0·5 centimetre in diameter. Each was surrounded by a pale red zone about 3 mm. in breadth. On sections the greater part of the infiltration was not in the skin itself, but in the subcutaneous tissue. Anthrax bacilli were sparingly present in the skin lesions, mesenteric glands, and blood.

FORGEOT (P.). Vaccination intradermique de la chèvre contre le charbon bacteridien. [**Intradermic Vaccination of the Goat against Anthrax.**]—*Bull. Soc. Path. Exot.* 1927. Mar. Vol. 20. No. 3. pp. 208–209.

CLAVERIE having drawn attention to the danger attending the vaccination of goats by the intradermal method on account of their greater susceptibility than that of sheep, the author, working in Turkey, where mixed herds are common, thought it well to carry out preliminary trials of the method. Two goats, of the breed reputed to be the least susceptible (Kara-kil breed) were inoculated intradermally in the tail with $\frac{1}{2}$ cc. of 2nd Pasteur vaccine. There was no local reaction, but one showed a slight febrile reaction, similar to that sometimes shown by sheep after intradermal inoculation with $\frac{1}{4}$ cc. Since there was no untoward result five more goats were inoculated. One died during the same night. No lesions of anthrax were found, and bacilli were not demonstrable in the blood, but tubes of broth and agar showed colonies on the next day but one. Inoculation with these gave a positive result. [It is not stated what animal was used for this.]

On the second day after inoculation another goat died. Again there were no lesions and bacilli were demonstrable in the blood by cultivation only, and then only after 48 hours.

The author is not able to furnish any explanation of these curious results.

STOLYGVO (N.). Zur Frage über die Wirkung der Salvarsanpräparate, inklusive Stovarsol und Treparsol, beim experimentellen Milzbrand. [**The Action of Salvarsan Compounds, including Stovarsol and Treparsol, in Experimental Anthrax.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6–7. pp. 364–367.

The author was prompted to carry out experiments regarding the treatment of experimental anthrax by means of salvarsan because of the contradictory results published by others.

In most cases a fully virulent culture was used in the experiments. Dosage is a matter of some difficulty because strains vary in virulence and because variations occur with the same strain on different media. This difficulty was to some extent overcome by the inclusion of untreated controls.

Experiments showed that a safe dose of neosalvarsan was 0·1 g. per kilogramme. In the first series of experiments 10 guineapigs and four rabbits were inoculated intracutaneously with a sporulating agar culture. The neosalvarsan solution, in strength not exceeding 4·5 per cent. was injected in doses of 0·1 to 0·15 g. per kilog. Guineapigs were injected intracardially and rabbits into the ear vein. In no case was death prevented, but most of the animals survived considerably longer than the controls.

A reduction in the dose to ·03 g. per kilog. was without any effect at all.

In view of the extraordinary virulence of anthrax for rabbits and guineapigs the infective dose was reduced, but this did not influence the results to any extent, whether the dose were introduced intracutaneously, subcutaneously, or intraperitoneally provided the dose was rich in spores.

Quite different results were obtained when a fresh 24-hour broth culture containing a minimal number of spores was used. A loopful of this proved fatal by all the paths of inoculation to control animals in 36–48 hours, but injection of a sufficient dose of salvarsan saved the animals' lives.

It was found that the latest at which treatment could be applied with success was 6 hours after infection in guineapigs and 10–12 hours in rabbits.

Attempts were then made to reduce the dose, and it was found that in rabbits the minimum was 0·1 g. and in guineapigs 0·04 g. per kilog.

Treparsol and stovarsol were found to be ineffective even in large subtoxic doses.

BROUDIN (L.). La pasteurella aviaire de Cochinchine. Son bactériophage. La prophylaxie de la maladie. [**Avian Pasteurellosis in Cochinchina. Its Bacteriophage. The Prevention of the Disease.**] —*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 315–318.

Fowl cholera is the most serious plague of birds in Cochinchina, and fowl diphtheria occupies the second place. The former occurs during the rains, but the later is encountered principally during the dry season.

Of 36 strains studied, 19 caused blackening in lead agar; practically all cause acid formation without gas in glucose, mannite, and sacchacose. Lactose and maltose usually remain unchanged. Indol is produced in almost all cases in peptone water.

The medium used for diagnosis is the yeast-water recommended by STAUB and TRUCHE. Bone marrow is used exclusively as seed material, as it almost invariably contains the bacillus in a state of purity.

The bacteriophage was first isolated in October 1925, by filtration through an L.3 candle of a broth culture of a strain which yielded abnormal colonies on agar. The best medium to use to obtain the bacteriophage is chicken broth neutralized to phenol phthalein.

Strains containing bacteriophage occur more frequently than is generally believed, particularly during the dry season when outbreaks are infrequent.

The lysates of lysogenic cultures may be dangerous when used as vaccines because secondary cultures may be produced after a time in animals vaccinated.

A vaccine prepared from non-lysogenic strains appears to be valuable. A single dose suffices.

DOYLE (T. M.). **Observations on** *B. pullorum.* **Infection of Cock Birds.**— *Vet. Jl.* 1927. June. Vol. 83. No. 6. pp. 305–309.

The author finds that as a general rule the agglutination titre of a "carrier" cock bird is lower than that of a hen bird, and he recommends taking 1 in 15 as the standard at which complete agglutination indicates infection, but a second test after a month is advised, since cock birds appear to overcome the infection more rapidly than hen birds. At the same time it appears to be a fact that the agglutinin content fluctuates. The author has isolated the bacillus from infected cock birds from the testes, spleen, wall of the gall-bladder, and heart muscle.

BENNETT (S. C. J.). **Haemorrhagic Septicaemia in Cattle in India.**— *Agric. Jl. India.* Vol. 21. No. 5. 1926. pp. 351–356.

Haemorrhagic septicaemia of cattle is a disease having a seasonal and regional distribution. The largest outbreaks occur during the summer monsoon. The cause is an organism of the Pasteurella group, and it is notable that under artificial cultivation the organism rapidly loses virulence, but this can be restored by animal passage. The organism can maintain itself and multiply outside the body in soil and water. There is no justification for thinking that the diseases of the bovine and buffalo are different; cases may occur more frequently in buffaloes than in bovines, but this is due to the different habits of life of the two types of animals. Infection is usually by way of the alimentary canal, but it is not improbable that biting flies may play a part.

Death generally occurs very rapidly, and in fact, symptoms of illness are often not noticed. In cases where death is delayed till the second day, there is usually a marked rise of temperature. Shivering and lameness are early symptoms. When these have appeared swellings develop on some part of the body. These are particularly noticeable about the head and neck. There is evidence of abdominal pain and at first constipation but subsequently diarrhoea sets in. In the later stages there is respiratory distress; salivation and lachrymation are well marked. Diagnosis is readily based upon examination of blood smears.

For prophylactic purposes vaccine is superior to serum since the period of immunity is longer, but as is generally the case the vaccine is slower in action than the serum. The vaccine is a dead one. It has been found inadvisable to use an attenuated living vaccine because of the risk of infection in highly susceptible animals, and because it is essential that nothing unexpected should happen to vaccinated animals and thus destroy the confidence of owners.

It may be possible to devise a simultaneous method.

GHEORGHIU (J.) & BARTH (C.). Epizootie provoquée chez les cobayes par un bacille du groupe " Salmonella." Essais de vaccination. [**Epizootic in Guineapigs caused by a Bacillus of the " Salmonella " Group. Attempts at Vaccination.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1182–1183.

The authors have previously described a disease in rats characterized by the formation of nodules of an adenomatous nature in the lungs, liver, spleen, and kidneys, and by ulceration and thickening of the intestines. This condition is caused by a Salmonella. Experimentally this disease is transmissible to the guineapig.

During the present year a natural outbreak of the disease occurred among guineapigs 15 days after these had been in contact with naturally infected rats. The mortality was at first light, but eventually 50 per cent. of infected animals died. Cultivations from the diseased organs showed that the same bacillus was present.

As no means of controlling the disease was known it was decided to try immunization.

At intervals of 5 days, 0·1 to 0·3 and 0·3 cc. of an emulsion of the organism were injected. An agar culture supplied 15 cc. of vaccine. It is not said whether the vaccine was of modified virulence, but presumably it was not. The mortality ceased after the first injection, but it caused abortion in pregnant females, and some of such females died.

TAHSSIN-BEY (S.). Untersuchungen über eine Meerschweinchenseuche. [**A Plague in Guineapigs.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6–7. pp. 374–381.

The author describes the symptoms, pathological anatomy, the morphology and cultural characters of the causal organism, transmission and immunization of a naturally encountered disease of guineapigs.

The disease is a chronic one, and there is no great change in the general condition of infected animals. It is only in the last stages of the disease that the animals become dull and are disinclined to move. The appetite is generally well maintained.

At the post-mortem there are generally lesions of the mesenteric gland and of the sacral glands. These take the form of abscess-like structures with thick fibrous capsules. The contents are thick and creamy. As a rule they are sterile. In recent cases only can be found scattered bacilli in intact leucocytes. In the liver and spleen nodules up to the size of peas with soft centres are encountered. Usually it is easier to obtain cultures from these lesions than from those in the mesenteric glands.

In acute cases these lesions may be absent, and there may only be congestion of the intestinal mucous membrane, slight oedema of the mesenteric glands, and some dullness of the peritoneum.

Histologically there is a necrotic centre surrounded by a zone of reaction.

As already noted the causal organism is as a rule not demonstrable in the advanced lesions, and although it is present in the blood in acute cases, it cannot, as a rule, be recognized microscopically. The organism is a short stout bacillus measuring 2μ–3μ in length by 0·5μ in thickness. In smears from organs a thin capsule is generally demonstrable. The organism is non-motile.

In broth it produces general turbidity, with a heavy deposit after a few days. Milk is not coagulated by some strains (Strain A) but strain B causes coagulation.

A tabular statement gives the various cultural characters of the two strains.

The disease is readily transmissible by inoculation with cultures provided that the strain has not been cultivated for more than 3 generations.

The infection is not transmissible to the rabbit, except in so far that an abscess is formed at the seat of inoculation; but death may occur nevertheless.

The mouse dies from septicaemia in 24 hours.

Inoculation with cultures killed by heat establishes immunity, and also with filtrate from a 15-day-old broth culture.

EDWARDS (J. T.). **Vaccination against Blackquarter in Cattle and Sheep.**—*Agric. Jl. of India.* 1926. Nov. Vol. 21. No. 6. pp. 419–420.

This is a brief note about germ-free filtrate vaccination.

MYCOTIC DISEASES.

CERNAIANU (C.) & SCHLENKER (T.). Les associations bactériennes dans la lymphangite épizootique. [**The Bacteria occurring in Lesions of Epizootic Lymphangitis.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1170–1172.

The authors state that prior to the war epizootic lymphangitis of solipeds was unknown in Roumania, and that it was introduced by the French army. Subsequently, it became rather widespread.

A number of investigations have shown that bacteria present in the lesions play a not inconsiderable part in rendering the disease difficult of treatment.

From recent unopened lesions, which have been reached by penetrating normal healthy skin, the authors have cultivated *Staphylococcus pyogenes* occasionally, and a streptococcus of the strangles type in a few instances. From lesions which are on the point of rupture, the above two bacteria have been obtained frequently, and then in order of increasing infrequence, *Micrococcus tetragenus*, Preisz-Nocard bacillus, a diplococcus and colon bacilli. As was to be expected the bacterial flora of opened lesions was more varied.

It appears that all the lesions examined were provided by a single case of the disease, and that the animal had given a reaction to the intradermal mallein test which was considered as very suspicious. There is no mention of the recovery of the glanders bacillus.

The case was treated on the lines advised by NAINSOUTA; that is to say, 10 intravenous injections of 0·1 g. of biniodide of mercury in 50 cc. of distilled water were given at intervals of two days. There was scarcely any improvement in the conditions of the lesions.

DISEASES DUE TO FILTERABLE VIRUSES.

WALDMANN (O.) & REPPIN (K.). Die Dauer der Infektiosität der Mundschleimhaut bei der Maul- und Klauenseuche des Rindes. [**The Period of Infectivity of the Oral Mucous Membrane in Foot and Mouth Disease in Bovines.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Jan. 16. Vol. 55. No. 4. pp. 407–429.

Two series of experiments were carried out. In the first the virulence of the saliva at different intervals after infection was tested upon guinea-pigs and in the second the persistence of the virus in epithelium from bullae was tested. Finally, parallel tests were carried out with saliva and epithelium from one and the same animal.

The results showed that the virus could be detected in the saliva nine hours after infection, and up till the 6th day but not later. When saliva and epithelial shreds were used for the guinea-pig inoculations the virus could be detected up to the 11th day, that is 8 days after generalization.

Experiments carried out in parallel showed that there was a connexion between the presence of epithelium and the infectivity of materials obtained from the mouth. Inoculation with material containing epithelium yielded 89 per cent. of positive infections, while in the case of saliva alone, the percentage was 22 per cent.

The time of disappearance of the virus from the mouth is marked by the complete removal of epithelial fragments from the lesions and by the appearance of granulations.

BEDSON (S. P.), MAITLAND (H. B.) & BURBURY (Y. M.). **Further Observations on Foot-and-Mouth Disease.**—*Jl. Comp. Path. & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 5–36.

This paper is divided into three sections dealing with: (*a*) Experimental studies of immunity in guineapigs to Foot and Mouth disease; (*b*) The survival of the virus of Foot and Mouth Disease when dried upon various materials; (*c*) Foot and Mouth Disease in rabbits and rats. Sections *b* and *c* are by Burbury. It is impossible to compress into a brief extract the immense amount of detailed information contained in the original, which must be consulted by those interested.

The conclusions arrived at may however be summarized as follows.

The best results have been obtained by the intradermal inoculation of guineapigs. Ill-nourished animals may fail to develop well marked lesions and give a poor immunity response. Attempts to titrate the virus by intramuscular or intraperitoneal inoculation have failed.

It has been possible to show that different grades of immunity may be produced in guineapigs by infection and prophylactic inoculation. The lowest grade corresponds to insusceptibility to intramuscular inoculation. A higher grade is the absence of generalized lesions after a primary vesicle on the plantar pad. Complete resistance is indicated by a failure to react to intradermal inoculation.

Guineapigs which have recovered from infection accompanied by generalization are immune for several months against the homologous virus; this immunity is relative to the dose of test virus. The degree and duration of the immunity varies in different guineapigs.

The resistance of guineapigs can be exalted by intramuscular inoculation of living virus in sub-infective doses with or without immune

serum. Formalinized virus confers protection, but in preparing the virus incubation beyond the point at which the virus becomes non-infective should be avoided. The immunity is set up very rapidly. An increase in resistance can be detected within 48 hours, and the immunity has been observed to last for three months. Its duration has not been determined. Repeated intradermal inoculations with formalinized virus sets up complete immunity.

The vaccine retains its properties for periods up to 6 months in cold storage. Formalinized serum from infected guineapigs immunizes as well as formalinized vesicle fluid in proportion to the amount of virus contained in it. In infective blood, the greater part of the virus is in the serum.

Virus diluted 1 in 50, dried on glass slides, and kept in a dry atmosphere at 18° C. survived from 4 months to a year. Under the same conditions, except the temperature, i.e., at 37° C., it survived only 2 to 7 days. At 18° C. in atmospheres 50 and 70 per cent. saturated with water vapour the survival was also about 5 days. Similar results were obtained with undiluted defibrinated blood.

Virus dried on fabrics kept at 56°–60° F., and in an atmosphere 52 per cent. saturation survived 2 to 14 days. The longest period of survival was on bran and hay in the dark at 56°–60° F. Under these conditions the maximum was 20 weeks. Exposure to light through window-glass reduced the survival.

In experiments carried out with rabbits, wild, and white rats, these animals were found to be susceptible to infection with guineapig virus by inoculation. Natural infection is rare. Passage of the virus through rabbits and rats does not attenuate it for the guineapig.

BELIN (M.). Premières tentatives de vaccination anti-aphteuse réalisée à l'aide des complexes vaccino-aphteux. [**First Attempts in Anti-Foot-and-Mouth Vaccination by means of Vaccine-Foot-and-Mouth-Virus Complexes.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1116–1118.

The author claims that his vaccinia-foot-and-mouth-virus complex can be used without danger for the immunization of cattle against foot-and-mouth disease. It does not appear that the vaccination produces any negative phase. Second vaccines should not be given before the 20th day after the first.

The introduction of the complex causes the development of an abortive vaccinal eruption or even only a slight inflammation. The reaction does not affect the secretion of milk, the general condition or capacity for work.

The foot-and-mouth virus contained in the complex has never shown any tendency to return to its original virulence.

The number of animals used in the experimental observations does not appear to have exceeded 10 in any instance.

SPERANSKY (A.). Faits nouveaux sur la pathogénie et la prophylaxie de la rage. [**New Facts in connexion with the Pathogenesis and Prophylaxis of Rabies.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 166–188. With 5 text figs.

The author believes that rabies should be classed as a toxic encephalitis.

The dominant symptoms are the result of sub-cortical lesions in the brain.

In rabies caused by the fixed virus the first symptoms are those of inco-ordination. Then follows the stage of spasmodic paralysis and eight to twelve hours later the stage of complete paralysis. These symptoms are characteristic of sub-cortical lesions and are not specific. They appear in more or less pronounced form in any intoxication of the nervous system. During the first stage the animals retain the capacity to react to stimuli. The most striking feature of rabies caused by fixed virus, and one which distinguishes it from street rabies, is the extreme constancy of the train of symptoms. The author has had under observation a large number of dogs and rabbits, and has never noted any variation. The symptoms of street rabies are more variable and complicated, but symptoms indicative of sub-cortical lesions predominate. The period of excitement which is characteristic of the early stage of street rabies is practically absent in the disease produced in the laboratory. [Presumably the author refers to " fixed virus " rabies.] After this has passed, the symptoms of inco-ordination and subsequent paralysis appear, and during these phases there is no essential difference between the two conditions.

The excitement, the author believes, is due to reaction to stimuli. He found that a dog in the early stage of the disease would lie perfectly quiet, if left absolutely at rest. An observer could sit and watch the animal without causing any exhibition of excitement, provided he sat quite motionless, but the slightest movement or sound caused a reaction in the animal. This was also noted when the paralytic stage was supervening, and the dog was lying broadside. Touching the animal still elicited a response, the animal snapping at any object with which its body was touched, and then relapsing into a state of quietude.

The difference then in the symptoms of street rabies and fixed virus rabies is a quantitative one, and the latter condition proceeds to the paralytic stage at a greater rate than the former.

In one case, the subdural injection of a dose of anti-rabic serum, eighteen hours after the injection of a fatal dose of fixed virus, followed by a second dose of serum two days later, led to a prolongation of the period of incubation to double that of the fixed virus, and the appearance of a period of excitation.

Apart from the presence of specific changes in the cells such as Negri bodies, there always occur in toxic encephalitis of whatever sort perivascular infiltrations. This the author believes is not a defensive measure against a substance which is noxious to the nervous tissue and which circulates in the blood, since it occurs in brains subjected to local freezing. The author believes that the cerebro-spinal fluid is of importance in connexion with the development of the symptoms and lesions. He finds that withdrawal of this liquid prior to subdural injection with virus causes in dogs a delay of 15 to 24 hours in the development of symptoms as compared with the controls. Repeated withdrawal of the liquid after inoculation exercises no influence. The explanation offered is that the cerebro-spinal fluid acts as a distributor of the virus. The variations in the length of delay of the onset of symptoms depend upon the rate of regeneration of the liquid. This varies in different individuals. The author has attempted to restrict the action of the virus to a certain area of the cerebral cortex by inserting a ring composed of cotton and covered with celluloid between the brain and the dura mater and injecting the test virus into the area

isolated by this ring after allowing a period of some days to elapse in order to allow the ring to become adherent to the brain and meninges on either side. The result was a delay in the development of symptoms. In one case the delay was of three months' duration.

Acting upon these basal ideas the author has devised means for conferring immunity against rabies.

Anti-rabic sera, while generally very effective in *in vitro* experiments, are of little value in *in vivo* tests.

The failure of anti-serum by subdural injection is explained on the ground that thus injected it does not reach the virus. While it is believed that substances injected into the blood do not make their appearance in the cerebro-spinal fluid, those injected into the cerebro-spinal fluid rapidly make their appearance in the blood.

A claim is made that by withdrawing the cerebro-spinal fluid first and then injecting anti-rabic serum it has been found possible to protect dogs against infection. The virus and serum have been injected together or one after the other in both respects.

It is also stated that five cases of tetanus in man have been cured by the injection of anti-tetanic serum subdurally after the cerebro-spinal fluid has been withdrawn. It is essential that the withdrawal of the liquid should be complete. It must be actually aspirated. In no case has the operation on dogs been followed by accident, but it must be done under anaesthesia or else there is a risk of collapse as is seen in man when the pressure of the cerebro-spinal fluid falls.

The problem of obtaining local active immunity of the brain against the virus is complicated by the fact that the virus itself must be used for the immunization. It is therefore necessary to try to extract from the virus or from the brain of a rabid animal the material which would confer immunity.

In the investigation of toxic substances which make their appearance in the brain as the result of partial freezing attention was drawn to the essential part played by the cerebro-spinal liquid in the disintegration of nerve tissue. This occurs more or less rapidly while the other albuminoid substances are altered little or not at all.

Since rabies is a disease leading to damage being inflicted on the nervous tissue it must be admitted that there is a substance which is fixed by the tissue. As the results of the disintegration of the nervous tissue in the cerebro-spinal liquid the toxic agent would be freed.

To prepare a vaccine for active immunization the following methods have been used. The brain of a rabid rabbit was ground in a mortar with 5 to 10 volumes of ox cerebro-spinal fluid. The resulting emulsion was incubated at 37° C. for 27 to 36 hours. with frequent shaking. After centrifugation and filtration through a Berkefeld filter the liquid was stored in ampoules. Some of these were heated to 50° C. for an hour, and others were left unheated.

These vaccines were injected into the subdural space of rabbits, in doses of 0·5 to 1·5 cc., three or four doses being given at intervals of 24 to 48 hours.

Outlines of the results of subsequent inoculations with virus are given, but as only 13 rabbits have been used and clear-cut results have not been obtained the author expresses no opinion upon them.

In experiments with dogs doses up to 40 cc. of the unheated vaccine have been injected into the subdural space without causing rabies. The injection of large doses sometimes produces spasmodic symptoms sug-

gestive of the first phase of rabies, but similar symptoms and even more marked symptoms are sometimes produced by the injection of a similar material prepared from healthy brain tissue.

BABLET, ADVIER & SOUCHARD. Recherches expérimentales sur le virus rabique des rues en Cochinchine. [**Experimental Studies of Street Virus in Cochin China.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 199–200.

Two strains of virus of native origin capable of causing paralysis in rabbits in 13 and 15 days respectively have been tested. Desiccation did not affect the virulence of the virus up to the 7th day, but there was marked attenuation on the 9th day and complete loss on the 10th day. Fresh brain immersed in glycerin retained its virulence unaltered up to the 30th day, but subsequently the virulence was lessened and there was complete disappearance by the 34th or 35th day.

Medullas subjected to 2 days' desiccation were still virulent after 20 days in glycerin.

After 4 days' drying, they remained virulent for 10 to 15 days.

Cords dried for 5 or 6 days showed a marked reduction in virulence after 10 days in glycerin, and those dried for 7 or 8 days are slightly virulent after 5 days' immersion.

MARIE (A. C.). Variations de la cholestérine au cours de l'infection rabique. [**Variations in Cholesterin in the Course of Rabies Infection.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 195–198. With 1 chart in text.

The author has found that the cholesterin content of the blood increases during an attack of rabies until towards the end of the stage of paralysis it may be 3 to 4 times the normal or ·75 to ·8 g. per litre.

In the present note the author gives the results of the examination of the supra-renals and brain substance with regard to their cholesterin-content.

During the period elapsing between inoculation and the appearance of symptoms there is a general tendency to fall in the cholesterin content of the adrenals, and this is continued until the day prior to death when a rise occurs. In the brain, on the other hand, the cholesterin content tends to rise until the onset of symptoms, after which it falls, but rises again on the day of death.

GIESE (C.). Schutzimpfungsversuche gegen die Tollwut bei Hunden. [**Protective Inoculation of Dogs against Rabies.**]—*Arb. a. d. Reichsgesundheitsamte.* 1926. Vol. 57. pp. 410–444. With 1 chart in text.

The introductory part of this paper gives the distribution of the cases of rabies in the domesticated animals in Germany during the years 1910–1924. The second section of the paper summarizes the literature regarding the methods of inoculation which have been devised for the protective inoculation of dogs.

An account is given of experiments in which the carbol-glycerinized virus method of Umeno and Doi was tested, and also the intraperitoneal injection of fresh fixed virus.

The single subcutaneous injection method devised by the Japanese investigators is said to be effective for the immunization of dogs if given before infection. Care must be taken, however, in using fixed virus for this purpose, as it may result in the production of either furious or dumb rabies. In fact, every fixed virus is not suitable for immunization purposes. Intraperitoneal inoculation with fixed virus is not practicable on account of the large amount of brain material required.

No evidence was obtained that dogs immunized by the Japanese method either spread the virus or act as carriers.

SCHIEN (H.). Notes sur la peste bovine. Variations de réceptivité des sujets dues à l'âge. Variations d'activité du virus. [**Cattle Plague. Variations in Susceptibility due to the Age of the Subjects. Variations in the Activity of the Virus.**]—*Rev. Gén. Méd. Vét.* 1927. Mar. 15. Vol. 36. No. 423. pp. 140–144.

This paper is in the nature of a reply to a criticism by VAN SACEGHEM of experiments recorded by JACOTOT and Schien.

With regard to the variations in susceptibility according to age, the author thinks that the best way of expressing it is to say that "in a large number of centres of cattle plague, the adults are generally more resistant than young animals, but there are numerous exceptions to the rule." This form of expression is more exact, because resistance is a secondary phenomenon, a character which is acquired under the influence of external causes. It is absent when these causes are not in play and it is not hereditary.

The fatal hypersusceptibility of young animals appears to be a primitive character, but the variation of susceptibility of adults is such that the causes for variation may be sought out and investigated.

Generally speaking, in areas where cattle plague is unknown or has not occurred for a long time, adults and young animals are equally susceptible. In endemic areas, young and adult animals are equally resistant. In countries where outbreaks occur with intervals of a few years between them, adults have a higher degree of resistance than young animals.

The actual susceptibility of the animal population to the virus is that of the young, and the virulence of the virus should be gauged by its effect on them.

The author thinks that the virus varies but little.

JACOTOT (H.). Transmission expérimentale de la peste bovine à *Cervus aristotelis*. [**The Transmission of Rinderpest to** *Cervus aristotelis*.]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1134–1135.

A one-year-old female specimen of *Cervus aristotelis*, obtained from an area that had been free from cattle plague for three years, was inoculated with infective blood. There was an incubation period of 2 days. Between the 3rd and the 8th days there was a marked febrile reaction, but other clinical mainfestations were slight. There was then another rise of temperature, and clinical symptoms were more pronounced. From the 15th day onwards there was a gradual return to normal. Throughout there had been no loss of appetite.

Two calves were inoculated as controls. One passed through a typical attack and recovered. The other died. The virus recovered from the deer was not modified in virulence.

BELLER (K.) & TAHSSIN Bey (Süreya). Die Kultur des Lüngenseucheerregers und seine Uebertragung auf kleine Wiederkäuer (Schaf und Ziege). [**The Cultivation of the Pleuro-Pneumonia Virus and its Transmission to Small Ruminants (Sheep and Goat.**)]—*Arb. a. d. Reichsgesundheitsamte.* 1926. Vol. 57. pp. 484–502. With 5 text figs.

The authors thought it desirable to test the possibility of the transmission of the pleuro-pneumonia virus to small ruminants, because of the possibility of some parallel existing between that disease and rinderpest.

Outbreaks of the latter occur, particularly in the Caucasus, which cannot be explained on any other ground.

Cultures were prepared in Martin's broth containing horse, sheep, or goat serum, and also in meat infusion containing the same sera adjusted to pH8·0. Such cultures failed to cause any symptoms of pleuro-pneumonia in sheep. But in animals that were pregnant changes occurred which led to abortion.

Culture media were then prepared using the flesh of foetuses and in others the serum was replaced by amniotic fluid. Growth occurred more rapidly in these than in the Martin's broth or meat infusion, and on agar media prepared in the same way the colonies were larger. Inoculation of sheep showed that it was possible to produce infection in both sheep and goats. The virulence for the goat appeared to be enhanced by one passage through that animal. In sheep, the typical lesions were not produced, but only a local temporary reaction. A possible explanation of this, is that the strain of virus used was not freshly isolated, but a laboratory strain which had been maintained for some time.

In pregnant animals the virus appears to find a suitable medium for growth in the tissues of the foetus, and the disease was limited to the uterus and its contents. Abortion is a sequel.

Passage through the sheep leads to an exaltation of virulence. The virus can be isolated from the tissues of the foetus.

In controlling the disease the sheep and goat must be kept in mind as possible carriers of the virus.

ORSKOV (J.). Etude sur la morphologie du virus péripneumonique. [**The Morphology of the Virus of Pleuro-Pneumonia.**]—*Ann. Inst. Pasteur.* 1927. Apr. Vol. 41. No. 4. pp. 473–482. With 4 text figs.

The author describes the results of his experiments in the direct observation of cultures of the virus of pleuro-pneumonia. As culture media he used horse serum agar or ascitic agar. These media were made in plate form in Petri dishes. The media must be as clear as possible, and the layer of uniform thickness. For examination little pieces of the agar showing growth are cut out, placed on microscope slides, and subjected to examination under the microscope. It is essential to have a good source of illumination for examination under

high magnifications, and for high powers a coverglass must be used. A minute drop of moisture between the coverglass and the medium greatly facilitates the examination.

The primary form of the virus is a small oval or short rod-shaped element which gives rise to a ramified mycelium.

The virus had a tendency to autolysis and to form elements which vary in shape and which have lost their power of germination. Different strains of the virus show this autolysis at different times.

FINDLAY (G. M.) & LUDFORD (R. J.). **The Ultramicroscopic Viruses. I. Cell Inclusions associated with Certain Ultra-Microscopic Diseases—A Pictographic Review.**—*Brit. Jl. Exp. Path.* 1926. Oct. Vol. 7. No. 5. pp. 223–255. With 50 text figs.

In this paper the authors review in pictographic form the literature dealing with the ultramicroscopic viruses. Various systems of nomenclature, and even of classification, have been suggested, but the authors doubt whether, in the present state of knowledge, any of these are justified. The uncertainty lies in our ignorance of the nature of structures discoverable in certain cells in the course of the diseases. The following diseases are dealt with :—Variola and vaccinia, Sheep pox, Fowl pox, Scarlet fever, Molluscum contagiosum, Trachoma, Rabies, Distemper, Varicella, Herpes, Meningo-encephalo-myelitis of horses, Virus III, infection of rabbits, Paravaccinia, Infections of unknown etiology, Virus from guinea-pigs, Foot and Mouth disease, Warts, Polyhedral and other ultravirus diseases of Insects, Fowl plague, Swine fever, African horse sickness, and a disease of Fowls. Reference may be made to those of more specially veterinary interest.

Sheep pox.—Study has shewn that the viruses of pox in the different domesticated animals are closely related, if not identical, but little work has been done upon the cytology of these conditions. It has been found that Guarnieri-like bodies are present in the infected epidermal cells.

Fowl pox.—The nature of the large intracellular bodies found in the epidermal cells in this condition is obscure. They are partly of a lipoid character.

Rabies.—The authors hold that few people still believe the definitely protozoal nature of Negri bodies. The view that the " inner bodies " represent the real virus is to be discounted. Many observers have been unable to demonstrate them. Special degenerations within the nerve cells are held by some to be the cause of the formation of Negri bodies.

Distemper.—The authors suggest that there has been some confusion between a special form of encephalitis and distemper (nervous form) in dogs. LENZ, STANDFUSS, SINIGAGLIA, BABES and STARCOVICI, KANTOROWICZ and LEWY, and others have described cell inclusions in the nerve cells of dogs suffering from nervous distemper, but the structures described by some of these authors closely resemble *Encephalitozoon cuniculi.*

Borna disease of horses.—JOEST has described bodies in the cells of Ammon's horn closely resembling those found in experimental herpetic meningo-encephalitis in rabbits. Others have failed.

Cellular inclusion bodies in Guineapigs.—JACKSON, GOODPASTURE, KUTTNER and COLE, have found protozoon-like cells in the salivary glands of guinea-pigs.

Inoculation of the salivary glands of old guineapigs into the brains, testicles, and submaxillary glands of young guineapigs has given rise to fatal meningitis.

Foot and Mouth Disease.—The cell inclusions found by GINS in the experimentally produced lesions in guineapigs are reported by RUHLE to have been found by him in the epithelial cells from the tongue of normal guineapigs and of cows.

Warts.—The intranuclear inclusions in the cells of infective warts in man and dogs are probably stages in the degeneration of nucleoli.

Fowl Plague.—KLEINE and SCHIFFMANN record finding bodies resembling Negri bodies in the ganglion cells.

Swine Fever.—UHLENHUTH and BÖING described Chlamydozoa in the swollen epithelial cells of the conjunctiva.

Horse Sickness.—KUHN in 1911 described cell inclusions in the renal epithelium.

LUDFORD (R. J.) & FINDLAY (G. M.). **The Ultra-microscopic Viruses: II. The Cytology of Fowl-Pox.**—*Brit. Jl. Exp. Path.* 1926. Oct. Vol. 7. No. 5. pp. 256–264. With 15 text figs.

The earliest indication of infection of an epidermal cell is the formation of a small vacuole, to the periphery of which small granules are attached. Mitosis is common in cells containing such vacuoles. The " virus " vacuoles increase in size and in number, and as they become enlarged they become enclosed by a lipoidal lining and present a granular appearance internally. Many cells become hypertrophied and at an early stage of infection there is a complete reversal in the polarity of the Golgi apparatus. The " virus " bodies tend to coalesce, and in the superficial cornified layers occupy cavities in the keratin.

MISCELLANEOUS.

METZGER (H. J.) & HAGAN (W. A.). **The so-called Stiff Lambs.**—*Cornell Vet.* 1927. Jan. Vol. 17. No. 1. pp. 35–44. With 3 figs.

The condition usually known as " Stiff Lambs " has been recognized for some years; and it has generally been assumed to be due to infections of the joints, tetanus, pneumonia, or post-natal weakness.

The disease is well known in the sheep-raising districts of New York. Some owners have lost lambs from it for a number of years in succession; others have encountered it only recently.

It occurs in lambs from two to eight weeks old. Accurate diagnosis is difficult in the early stages, and most of the clear-cut cases are seen in lambs from 4 to 8 weeks old.

It appears to occur most frequently in flocks soon after the lambs are turned out to pasture, but it has been seen in lambs still in barns or yards.

The symptoms are stiffness and difficulty in rising and a tendency to lag. Later, affected animals refuse to move. Usually the hind legs are affected, but the forelegs are sometimes involved. There is no evidence of disease of the joints, but in severe cases certain muscles appear to be rigidly contracted, and the legs may be partly flexed. By

traction the limbs may be straightened and this does not appear to cause pain, but on release the leg is quickly flexed again. The disease may become very marked within three or four days of onset, but more usually a week to ten days is required for the symptoms to become severe. There is no rise of temperature and no loss of appetite. Death is generally due to inability to move about for grazing.

Postmortem examination showed that certain muscles or groups of muscles which were rigid during life showed white streaks in section. It was noted particularly that the same muscles on both sides of the body were simultaneously affected.

The organs all appeared to be normal except the heart, and in this there were sometimes found whitish patches under the endocardium, usually in the right ventricle.

Bacteriological investigations of fresh carcases almost always yielded entirely negative results.

The earliest histological changes were found in muscles showing no gross evidence of disease. In these certain fibres appeared to have undergone a coagulative necrosis. In more advanced cases bundles of fibres were so affected and some of the fibres were in process of disintegration. A proliferation of the connective tissues is noted in these lesions.

No evidence was obtained that there was any concurrent disease of the joints and nerves supplying the diseased muscles.

The authors are unable to say whether the disease is the same as that described by HOBMAIER in Germany, in which acute nephritis was a constant lesion. They found naked eye evidence of disease in the kidney in one case only, and in this there was fatty degeneration of the epithelium of the convoluted tubes and dilation of the glomeruli.

LEPLAE (E.). Organisation et exploitation d'un élevage au Congo belge. i. Races Bovines. [**Organization and Development of Stock Breeding in the Belgian Congo. 1. Cattle.**]—*Bull. Agric. Congo Belge.* 1926. June–Sept.–Dec. Vol. 17. Nos. 2, 3 & 4. pp. 307–608. With numerous illustrations.

This volume is in the nature of a general report on the various aspects of cattle raising in the Congo. Feeding, hygiene, diseases due to diet, diseases due to parasites, internal and external, piroplasmosis, trypanosomiasis, pleuropneumonia, cattle plague, contagious abortion, anthrax, breeds of cattle both indigenous and imported, are dealt with from a general point of view. The report is copiously illustrated.

MITCHELL (D. T.). *Urginea macrocentra* (**Baker**) : **Its Toxic Effects on Ruminants.**—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 303–327. With 2 plates (1 coloured).

Urginea macrocentra is the so-called Natal slangkop (or snake head) and occurs along the coast belt and in the Natal Midlands. It is closely allied to the scillas. It grows in patches near swamps, but too much water prevents its growth. It is shallow rooted and easily dug out.

Cases of poisoning usually occur in the spring, and it is commonly thought that the toxicity varies inversely as the rainfall, but there is no experimental evidence to support the view. Probably there is a

greater chance of the plants being eaten in dry seasons. Young shoots of about 6 inches length appear to be the greatest danger. Cattle do not appear to eat the bulbs.

Naturally cases of poisoning occur in cattle only.

In the early stages dullness, depression, inappetence, tympanites and constipation are marked. In acute cases there may be acute diarrhoea, with abdominal pain. There is no elevation of temperature. Thirst is well marked. Polyuria is present to a varying extent. Death takes place in from four to fourteen days, and is preceded by a condition of coma.

Mortality does not, as a rule, exceed 5 per cent.

Sheep and goats may be poisoned by experimental feeding. In the former diarrhoea was not noted, but death may occur in 24 hours. The stems appeared to be more toxic than the other parts of the plant.

Approximate lethal doses are: Cattle (500 lb.), 1½lb. of stems or 2½ of leaves.

The lesions are congestion and oedema (slight) of the lungs, increase in the pericardial fluid, sub-epicardial haemorrhages. Thickening and hyperaemia of the mucous membrane of the alimentary tract generally are seen.

The kidneys are congested, particularly in the cortical and boundary layers.

In the matter of treatment, oleaginous purgatives appear to be superior to salines. The use of the trocar affords only temporary relief.

Prevention consists in fencing off dangerous areas and rooting out the plant. As the plant seeds easily rooting must be persisted in.

HENNING (M. W.). Krimpsiekte. [**Krimpsiekte.**]—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 331–365. With 33 figs.

This disease, which is characterized by symptoms implicating the nervous and muscular tissues, occurs annually in the arid parts of the Karoo. It appears during the spring and early summer and disappears when the stock are moved to summer grazing grounds. It continues to appear in stock kept on the Karoo in the summer, but its incidence is less if there have been good rains. The disease is most frequently seen among goats because it occurs in country suitable for goat-rearing only. Sheep exposed to the necessary conditions contract the disease, as do horses and ruminants. It has been reported in dogs as the result of eating Krimpsiekte carcases, and it has also been noted frequently in domesticated birds. Under the necessary conditions dogs are more susceptible than other species and succumb more frequently.

YAGI (K.). Untersuchungen über Geschwulste der Hübner in den Tropen. [**Tumours of Fowls in the Tropics.**]—*Taiwan Igakkai Zasshi.* (*Jl. Med. Assoc. Formosa.*) 1926. Nov. No. 260. 1–3.

Fibromata, lipomata, osteomata, sarcomata and carcinomata have been encountered in fowls. First generation transplants with osteoma and sarcoma succeeded, but subsequently transplantation failed.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. III. The Multiplication of *Rickettsia ruminantium* within the Endothelial Cells of Infected Animals and their Discharge into the Circulation.**—*Jl. Exp. Med.* 1926. Dec. 1. Vol. 44. No. 6. pp. 803–814. With 1 plate.

The author's experiments show that the virus of heartwater, and presumably the Rickettsiae, is present in the blood stream during the febrile stages and for about 6 days after the temperature has begun to fall. Rickettsia has not been found in blood films, but that is probably because they do not occur in large numbers in the blood but only as individuals or small groups. Single individuals might readily be decolorized in differentiating, whereas large masses would not. They have been found within vessels in sections.

The Rickettsia of heart water appears to differ from other known species in that it does not produce vascular degenerative changes. Its power of penetration appears to be less.

Many clumps may be found in a single cell, but they do not fuse, and such clumps may be of different sizes. It is suggested that the smaller ones are young colonies.

Appearances seen in sections suggest that Rickettsia multiplies by fission. The invasion of endothelial cells does not appear to damage the cell in any way or to change its vitality; the presence of the parasite seems merely to lead to distension.

The appearances presented in sections of Rickettsia escaping from endothelial cells are not, in the author's opinion, due to artefacts. Such escape has not been reported in other diseases in which Rickettsia have been found.

YAMAGIWA (S.). Ueber die in Südmandschurei beobachtete Lungenseuche des Rindes. [**Pneumonia of Cattle in South Manchuria.**]—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 68. (Author's German abstract.)

As a result of the examination of three natural, and one experimental, cases of the disease the author concludes that it is a complicated pneumonia of a sero-fibrinous-purulent, haemorrhagic-necrotic type. It resembles the epidemic influenza pneumonia of man.

NEVEU-LEMAIRE (M.). Essai de mammalogie médicale. 1. Les mammifères réservoirs de virus des maladies infectieuses de l'homme. [**The Mammals which act as Reservoirs for the Viruses of Diseases transmissible to Man.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 143–176. (To be continued.)

As our knowledge of parasitology increases a number of facts regarding the evolution of parasitic diseases show how animals play a more or less direct part in their transmission. In this paper the author catalogues the animals which act as reservoirs of such viruses. The author points out that the rôle is not the same in all cases. Sometimes they are subjects of diseases proper to themselves which are transmissible to man, such as anthrax and glanders. Sometimes they harbour organisms in a kind of latent condition, themselves possessing more or less immunity against them. Such a case is the harbouring of plague

bacilli by rodents. In many cases mammals act as intermediate hosts of worms parasitic for man. Others are hosts of the same parasites as man and assist in their dissemination.

In the present paper the author does not deal with the part played by mammals in the dissemination of helminth infections. That is left for a future publication. This paper deals only with the part played by mammals in infectious diseases caused by bacteria, mycoses, protozoa, and viruses of a nature up to the present unknown. The manner of transmission of the diseases is also considered. These include simple contact, biting, ingestion, or by some intermediate agent.

The author deals with the mammals in zoological order, beginning with the lowest. He indicates the geographical distribution, gives a few words regarding their biology when it is thought necessary, refers to the organisms harboured, and indicates the manner of transmission to man.

No abstract can be usefully made of the substance of a publication of this kind, but the foregoing abstract of the introductory pages will indicate the nature and scope of the original.

QUINLAN (J.) & DE KOCK (G.). **Two Cases of Rhinosporidiosis in Equines.**—*South African Jl. Sci.* 1926. Dec. Vol. 23. pp. 589–594.

Case I. A mule showed a number of pink tumour-like growths with irregular surfaces on the nasal mucous membranes. The smallest were about 2 mm. in diameter and 1 mm. in height, and the larger, which appeared to be formed by the coalescence of smaller growths, measured 2 cm. in diameter by 1·5 cm. in height. On section the growths were found to be composed of a central core of connective tissue with a much-altered mucous covering. No foci of pus were found. Embedded in the stroma were numerous cysts and spore morulae of Rhinosporidium.

Case II. A mule, eight years old. This animal during life showed dyspnoea when trotting and made a snoring sound during respiration. There was an intermittent discharge from the left nostril.

Surgical interference revealed the presence of a large granulation-like mass practically filling the left nostril. Higher up in the fossa the membrane was studded with growths.

Histologically the growths removed resembled those found in Case I. A cure was effected by operation.

FLEMING (A.). **On the Effect of Variations of the Salt Content of the Blood on its Bactericidal Power** *in vitro* **and** *in vivo*.—*Brit. Jl. Exper. Path.* 1926. Oct. Vol. 7. No. 5. pp. 274–281.

The author finds that intravenous injections of hypertonic saline solution cause a temporary reduction in the bactericidal power of the blood, which is followed by a marked rise in that power above the normal.

In the human subject the injection of an amount of salt which would cause an increase in the salt content of only ·01 per cent. yielded a marked rise in the bactericidal power of the blood.

The reason for this has not been ascertained.

SHMAMINE (T.). Agar als Einschlussmedium für die Untersuchung im Dunkelfeld. [**Agar as an "Inclusion Medium" for Dark Ground Illumination Investigations.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Jan. 3. Vol. 101. No. 4–5. pp. 279–281.

Three per cent. agar is liquefied and cooled to 40° C. A drop of this is placed on a warmed slide and the material for examination is mixed with it. A coverglass is placed in position and the melted agar is then rapidly cooled and the preparation is ready for examination. The effect is to slow down the movements of motile organisms and facilitate their study.

The preparations should be ringed with wax to prevent evaporation.

SUZUKI (S.). **On the Application of Papain for the Preparation of Culture Media.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 63. (Author's English abstract.)

The object of the author was to render available a part at least of the nitrogenous materials lost when meat infusion is sterilized by heat.

He summarizes his results as follows :—

1. 450 g. of raw meat were boiled by direct heat with the addition of 0·5 g. of papain powder and 30–55 per cent. of the total protein was obtained in solution. The amount of water used is not stated.

2. Bacteria grow in a medium so prepared and almost as abundantly as in Teruuchi-peptone-broth.

3. Tetanus toxin was produced in almost as great a concentration as in Teruuchi-peptone-broth or Hida-peptone-broth.